Sivvani Muthusamy

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EDUCATION

Carnegie Mellon University (CMU) - The Robotics Institute **Pittsburgh, PA**
Master of Science in Robotic Systems Development (MRSD) *May 2025*
Coursework: Visual learning & Recognition, Multimodal Machine Learning, Learning for 3D Vision, Geometric Computer Vision, Slam
Teaching: Mechatronics Design (16-778), Systems Engineering (16-650), SLAM (16-833), Autonomous Robotics (18-442)

National Institute of Technology - Tiruchirappalli **India**
Bachelor of Technology in Production Engineering; Minor in Computer Science | CGPA: 9.32/10 *July 2023*
Honors: Institute Gold Medal, KC Mahindra Fellow, DAAD WISE'22 Scholar, NTU India Connect'22 Scholar

EXPERIENCE

Nissan Advanced Technology Center, Silicon Valley **Jun'24 - Aug'24**
Robotics Intern *Finished Vehicle Logistics and Assembly*

- Developed an end-to-end SLAM system for **GPS-denied indoor navigation** using fiducial markers, achieving **10 cm** localization accuracy. Estimated camera **yaw error** using EKF-based extrinsic calibration, achieving **0.1 rad** accuracy
- Built a custom pipeline for accurate marker detection in motion using **Discriminative correlation filters**
- Implemented object detection and drivable area segmentation, optimizing inference on **Nvidia Orin** with **TensorRT**

Nissan Advanced Technology Center **Aug'23 - Dec'24**
MRSD Capstone - Teleoperation for parking *Carnegie Mellon University*

- Generated Bird's-Eye View (BEV) from 2D images using **Inverse Perspective Mapping** for teleoperation visualization
- Detected and localized the target car in the BEV using **multi-camera visual** data fused with odometry through EKF

Technical University of Munich, Germany **May'22 – Feb'23**
Robotic Perception and Control Intern *Munich Institute of Robotics and Machine intelligence*

- Curated customized dataset of **900+** images for dense 3D reconstruction of objects. Leveraged the reconstruction to estimate 6D pose using the **Deep Object Pose Estimation** model for optimal grasp point estimation
- Integrated vision-driven motion generation and enhanced grasping precision by **8%** using Franka robotic arm

Indian Institute of Technology, Kharaghpur, India **Feb'21 – May'22**
Junior Robotics Research Intern *Centre of Excellence in Advanced Manufacturing Technology*

- Designed a vision-based dimension inspection tool for industrial chassis using PnP approach, achieving **1 mm** accuracy
- Designed and analyzed a RL architecture combining Deep Deterministic Policy Gradient and **Hindsight Experience Replay**, achieving a **4%** improvement in task success rate for pick-and-place operations compared to baseline [1]

TECHNICAL SKILLS

Languages: Python, C, C++, MATLAB — **Frameworks:** ROS, Gazebo, CoppeliaSim, Mujoco, TensorRT, ONNX
Libraries: Numpy, OpenCV, PyTorch, Open3D, PCL, librealsense, Eigen, Ceres — **Tools:** Git, AutoCAD, Meshlab

PROJECTS

Geometric Priors for Multi-View Visual Localization | *16822 course* **Oct'24 - Dec'24**

- Enhanced a **pose regression** pipeline by incorporating geometric priors, enforcing multi-view consistency with relative pose error loss, and refining pose estimation using pose graph optimization (PGO) with **GTSAM**
- Achieved a **17.45%** reduction in camera pose error on the RobotCar dataset compared to the ACE baseline

Enhanced VINS Fusion with Deep Feature Extraction | *16833 course* **Oct'24 - Dec'24**

- Integrated SuperPoint and SuperGlue into the **VINS Fusion** SLAM pipeline for improved localization robustness
- Improved estimation accuracy and reduced Absolute Trajectory Error by an average of **2.94 %** on the EuRoC dataset

Discrete Space Diffusion Model for Action Anticipation | *16824 course* **Jan'24 - May'24**

- Developed a transformer-based diffusion model for action anticipation with temporal encoders for long-term dependencies
- Achieved **18.56%** accuracy on the **50Salads** dataset ($\beta = 0.5$), outperforming several baselines for long-term predictions

Categorical Object Organization and Shelf Placement | *16662 course* **Jan'24 - May'24**

- Implemented vision-driven object categorization and manipulation for efficient sorting and stacking of objects in shelves

Spatial Augmentation and Reconstruction of Objects | *Robotics club* **Dec'21 - Mar'22**

- Deployed Depth-Supervised **Neural Radiance Fields (NeRF)** model for 3D reconstruction of NITT clock tower